

REPRODUCTION IN ORGANISMS

classmate

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- * Each & Every organism → live for a certain period of time.
- * LIFE SPAN — Period from birth → Natural death.
 - not necessarily correlated with their sizes
- * DEATH of every organism → certainty
- * REPRODUCTION → biological process
 - enables continuity of the species, generation after generation
 - give rise to young ones (offspring)
 - grow & mature → in turn produce new offspring
- Thus, there is a cycle of birth, growth, death.
- * There is large diversity in biological world.
- * Each organism — evolved its own mechanism to multiply & prod. offspring.
- * FACTORS affecting "reproduction"
 - Organism's habitat
 - internal physiology
- * BASED ON → Participation of 'one' or 'two' organisms
 - 1. type
 - ASEXUAL
 - single parent
 - With or without gamete formation.
 - SEXUAL
 - 2 parents (opposite sex)
 - involves fusion of gametes.

- 1) Elephant - 60 - 90 yrs
- 2) Rose - 5 - 7 yrs
- 3) Dog - 25 - 30 yrs
- 4) Butterfly - 1 - 2 weeks
- 5) Crow - 15 years
- 6) Banana tree - 25 yrs
- 7) Cow - 20 - 25 yrs
- 8) Parrot - 140 years
- 9) Crocodile - 60 years
- 10) Horse - 60 yrs
- 11) Fruit fly - 2 weeks
- 12) Rice plant - 3 - 4 months
- 13) Tortoise - 100 - 150 years
- 14) Banyan tree - 200 - 300 yrs.

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ASEXUAL REPRODUCTION

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- ① Identical offspring
- ② exact copies of parent

→ CLONE - morphologically & genetically similar individuals

* Asexual reproduction common in single celled org.

plants

animals

with relatively simple organisations.

* Protists org. / parents divide by mitosis → give rise to new individuals.

* Monerans divide by

→ in these org. (cell division) itself → mode of reproduction.



* Many single celled org. by BINARY FISSION (equal halves)

Amoeba

Paramecium

* Budding → unequal small → bud; → prod. that remain attached initially to parent cell

→ YEAST

matures ← eventually, gets separated

* AMOEBA under → unfavourable cond. → withdraws its pseudopodia

ENCYSTATION ← this is

① secretes, ② 3-layer, hard covering / CYST

when favourable cond. returns → Encysted amoeba / PSEUDOPODIOSPORES

cyst wall bursts

Spores liberated in surrounding medium

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SPORULATION. ← this phenomena.

① Members of FUNGI

① Special

② SIMPLE PLANTS

② Asexual

ALGAE

through ③ Reproductive Structures

* PLANTS - Vegetative Propagation (asexual)

ANIMALS - Asexual Rep. (used unambiguously)

Units

Runner Rhizome Sucker tuber offset bulb.

Ginger Banana

potato

Pistia

Eichornia (water hyacinth)

Leaf buds

Bulbil - Agave

Bryophyllum

Veg. propagules → give rise to new offsprings

Asexual reproductive structures



- 1) Chlamydomonas - Zoospores
- 2) Penicillium - Conidia
- 3) Hydra - Bulges
- 4) sponge - Gemmules

Budding ~~Yeast~~ TANISHA SACHAN

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Binary fission — Amoeba

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NOTES

Fragmentation → Hydra (Each fragment capable of giving offspring → offspring classmate)

* *Eichornia Crassipes* → *Terror of Bengal* aquatic plants
→ most invasive weed found growing in → Stagnant water
→ Storing oxygen from water
→ resulting in death of fish
→ introduced in India bcz of
→ Beautiful flowers
→ Shape of leaves
→ very difficult to get rid off them
→ propagates vegetatively in a very small time

* Potato tuber - "eyes" → axillary bud

* *Banana* → Rhizome
* *Rhizome* → *Banana* → *Ginger*

* All the new plantlets invariably arise from NODES present in modified stems of these plants.

* When nodes come in contact with damp soil water they produce new roots

* Adventitious buds arise from notches present at margins of leaves of *BRYOPHYLUM*

* This ability fully exploited by * Gardeners * Farmers } for commercial propagation of such plants

* Asexual Reproduction → common in organisms with relatively simple organisation

like
Algae
fungi

Onset of unfavourable/ adverse condition. before Sexual Reproduction they shift to

Asexual repr. (alg.)

Sexual Repr.

occurs in
Higher plants

Only Sexual mode Repr

in

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Most of the animals

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Name of organism	Chromosome number in meiocyte (2n)	Chromosome number in gamete (n)
Fruit fly	8	4
House fly	12	6
Onion	16	8
Maize	20	10
Rice	24	12
Apple	34	17
Cat	38	19
Rat	42	21
Human beings	46	23
Potato	48	24
Dog	78	39
Butterfly	380	190
<i>Ophioglossum</i> (an adder's tongue fern)	1260	630

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SEXUAL REPRODUCTION

elaborate

complex

slow process

as compars. Asexual Repro.
ed to

- ① Involves — Formation of ♀ & ♂ gametes
- either
- Same individual
- Different individual (of opposite sex)
- those fuse form
- Zygote
- "new organism" which develops to form
- parents
- among themselves

① Plants
 ② Animals
 ③ Fungi

differ greatly in

external morphology
 Internal structure
 Physiology

but they share

similar pattern in sexual Reproduction

(JUVENILE PHASE) → Period of growth

Variable duration in different organisms

All organisms have to reach certain growth before reproducing sexually

certain maturity

in plants → VEGETATIVE PHASE

* End of Juvenile/Vegetative phase marks the beginning of Reproductive phase

can be easily seen in higher plants when they come to flower.

* Seasonal fruits — Mango, Apple, Jackfruit

These show clear cut phases

Annual

①
 ②
 ③
 Veg. Repro. Sessile

Plants

don't show clear cut phases

Perennial

Some plants exhibit Unusual flowering

Bamboo

* Flower only once a life time

50 - 100 yrs

* Produce large no. of fruits & die

Neelakurunji

Strobilanthes
Kulthiana

* Flower once 12 yrs

* flowered in - Sept - Oct 2006

(Sept - Oct 2018)

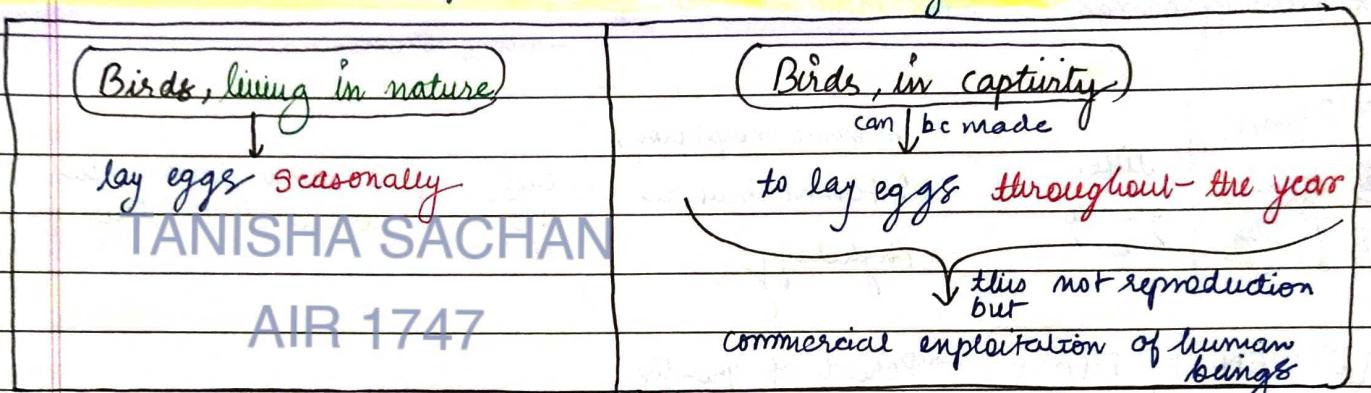
① Mass flowering of neelakurumji → Transformed large tracts of hilly areas into BLUE STRETCHES classmate
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Kerala Karnataka Tamil Nadu

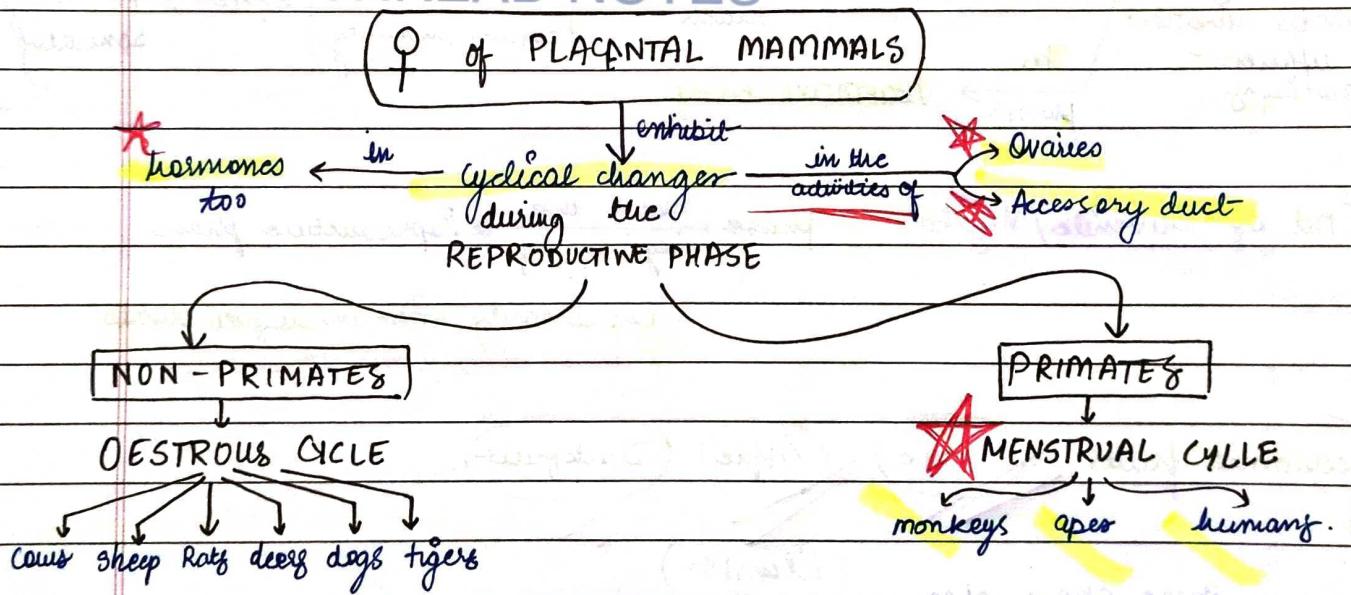
attracts a lot of tourists

* IN ANIMALS → Juvenile phase followed by Morphological changes → Physiological changes prior to reproductive phase

* REPRODUCTIVE PHASE → Variable duration in different organisms.



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* Many MAMMALS living in natural conditions "SEASONAL BREEDERS"

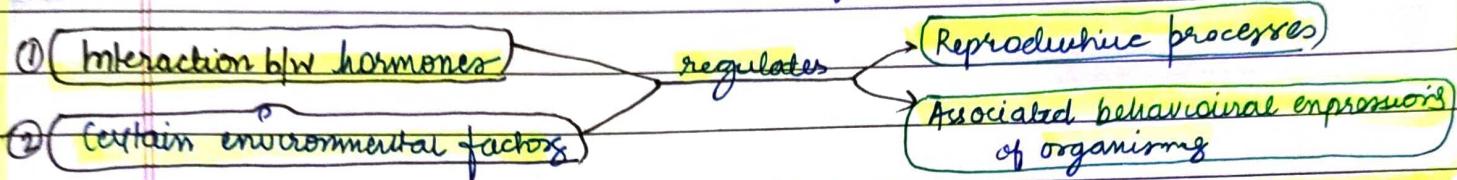
exhibit such cycles only during favourable seasons in their reproductive phase

* Many other mammals are reproductively active throughout Reprod. phase "CONTINUOUS BREEDERS"

* End of Reproductive phase can be considered as one of the parameters of senescence / old age classmate
 There are concomitant changes in body during last phase of life span.

* Old age ultimately leads to death.

* In both PLANTS and ANIMALS HORMONES are responsible for transition b/w 3 phases



(EVENTS IN SEXUAL REPRODUCTION)

After attainment of maturity All sexually reproducing org. exhibit events that have Remarkable FUNDAMENTAL SIMILARITY
 very different are structures associated with sexual Reprod. even through
 Sexual Repro. characterised by fusion of ♀ & ♂ gam.
Form. of zygote
embryogenesis

(PRE-FERTILIZATION EVENTS)

① All events prior to fusion of gametes.

2 main events
 ① Gametogenesis ② Gamete transfer.

① (Gametogenesis) Process of formation of 2 types of gamete \rightarrow ♀ ♂

Gamete - haploid. (homogametes)

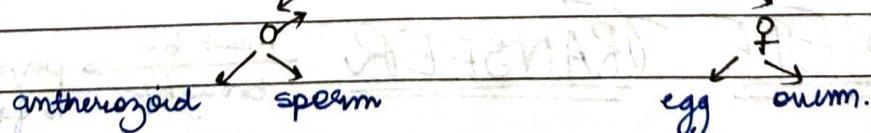
* In some algae \rightarrow ISOGAMETES Cladophora

\hookrightarrow ♀ & ♂ gam. can't be distinguished

* Majority of sexually reproducing org - HETEROGAMETES \rightarrow 2 morphologically distinct type

• Homo sapiens

• Fucus



Sexual repro. generally involves fusion of gametes (NOT ALWAYS TRUE !!!)

Monoeious



Cucurbits

Coconuts

Dioecious



Papaya

Date palm

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- * There is a need for a medium through which gamete move
 - * In several simple plants → Algae, Bryophyte, Pteridophyte
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- WATER is med. → Through which gamete transfer takes place!

- * Large no. of male gametes → fail to reach the ♀ gametes

hence
no. of ♂ gametes = $\times 1000$ times of ♀ gametes

- * In seed plants, Pollen grains → carry male gamete
- Ovule → egg

- * Eg. of Self fertilizing plants - Peas

(anther & stigma located close to each other)

- * For fertilization → successful transfer & coming together of gametes imp.
- ↓
MOST CRUCIAL EVENT
IN SEX. REPR.

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FERTILIZATION

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- * Most vital event of sex. repr. - fusion of gametes → Zygote (syngamy)

FERTILIZATION ← whole process

- * Fertilization often used interchangeably

Syngamy } though

- * { PARthenogenesis } → ♀ gamete undergoes development to form a new organism without fertilization.

Rotifers Honey Bee Some Lizards Few Birds (Turkey)

① majority of algae

② fishes

③ amphibians

- ④ External Fertilization/Syngamy

organisms

Showing great synchrony b/w this shows

Frogs Bony fishes

series

large no. of release of gametes into surrounding medium (water)

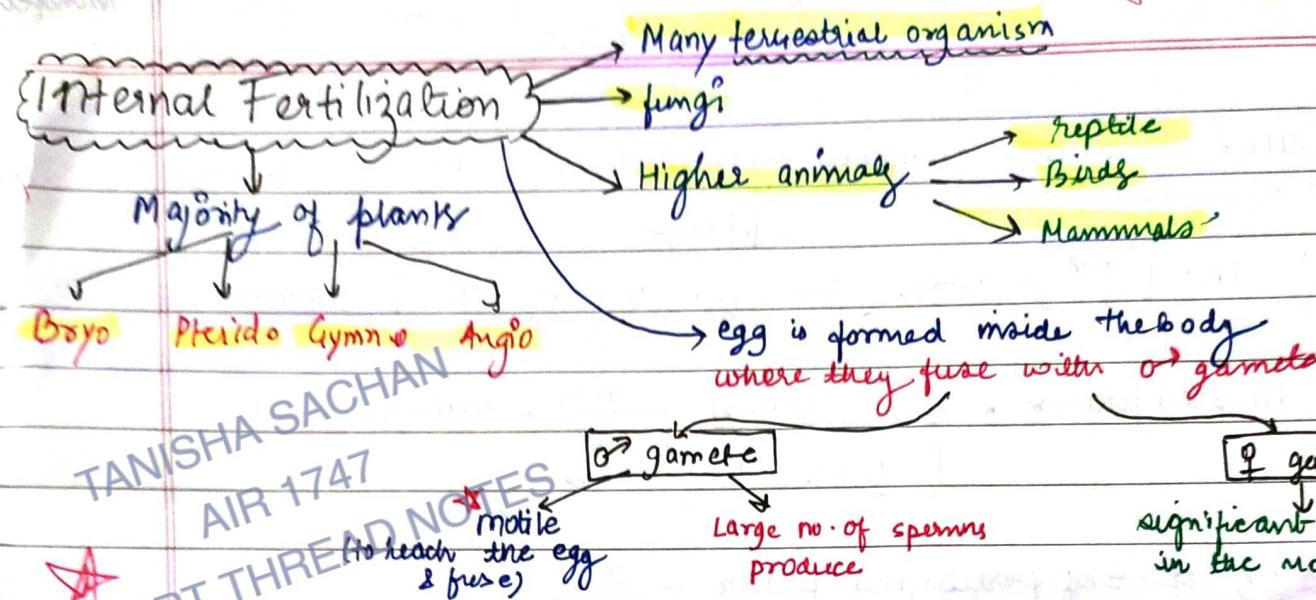
in order to enhance syn.

Major disadvantage - offsprings are extremely vulnerable to predators threatening their survival upto adulthood.

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In seed plants, { Non motile ♂ gamete } carried to Female gamete

By - Pollen tube

POST FERTILIZATION EVENTS

Events after the formation of Zygote.

ZYGOTE

VITAL LINK that ensures continuity of species b/w org. of one generation & next

Formation of Universal in all the sexually reproducing org.

- External fertilization - Zygote formed in ext. medium (water)
- Internal fertilization - " " inside body of org.

Further development of Zygote depends on

Type of life cycle

② environment - org. is exposed to

- ① FUNGI
 - ② ALGAE
- Zygote develops a thick wall that is resistant of dessication damage

② It undergoes a period of Rest before germination.

- Every sexually reproducing organism including HUMAN BEING starts life as Zygote

EMBRYOGENESIS

refers to process of development of embryo from zygote

during it Zygote undergoes cell division (mitosis) & cell differentiation

① Cell division increases

no. of cells in the developing embryo

② Cell differentiation

helps grp of cells to undergo certain modification

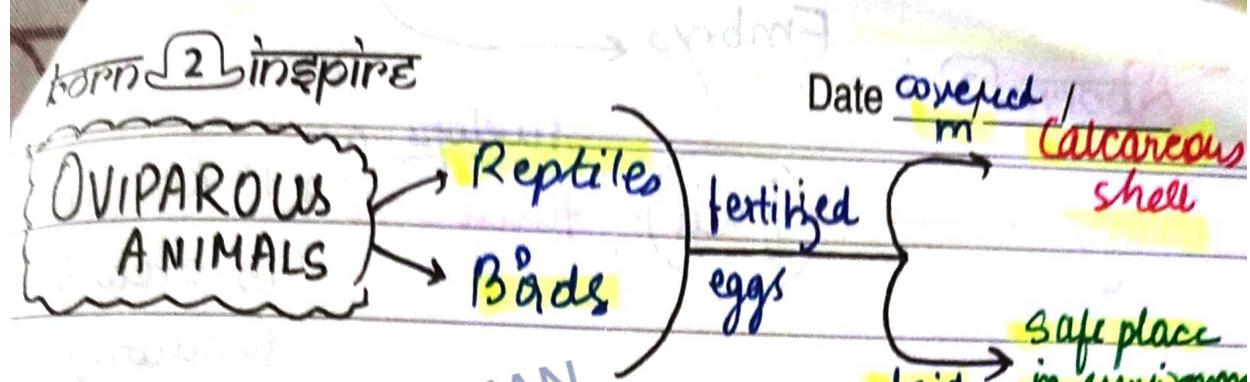
to form specialised tissue & organs to form organism

* Whether development of Zygote takes place outside the body or inside the body (female parent)

Lay fertilized / unfertilized eggs give birth to young ones

OVIPAROUS

VIVIPAROUS



Young ones hatch out after a period of incubation

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VIVIPAROUS ANIMALS

Majority of mammals (including humans) →

Zygote develops into young ONE inside the body of ♀ org.

Young ones delivered out after attaining a certain stage of growth

* Bcz of → Proper embryonic care → chances of survival of young ones is greater

→ Protection

* In flowering plants → zygote is formed inside the ovule

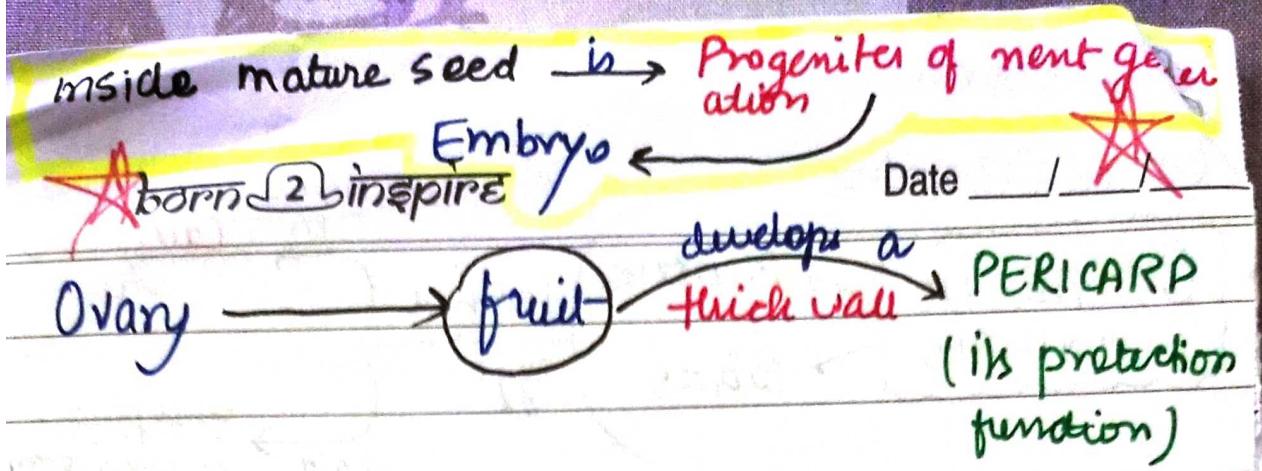
After fertilization →

→ Sepals
→ petals
→ stamen of the flower } → wither & fall off

Pistil] remains attached to plant

zygote → embryo

ovule → seed



* After dispersal → seeds germinate under favourable cond. to produce new plants.

* Reproduction enables species to live generation after generation

* Asexual Reproduction → does not involve fusion of gametes

common in

Relatively simple org.

fungi algae invertebrate animals

① * Budding] are common asexual methods seen in lower animals.

② Gemmule form

* Sexuality is varied, particularly in Angiosperms,

due to
prod. of diverse types of flowers.

* Transfer of easy in biennial org.

♂ gametes → Unisexual me by copulation of simultaneous release.